NASA Innovative Advanced Concepts

Holographic Optical Method for Exoplanet Spectroscopy (HOMES)

Completed Technology Project (2012 - 2013)

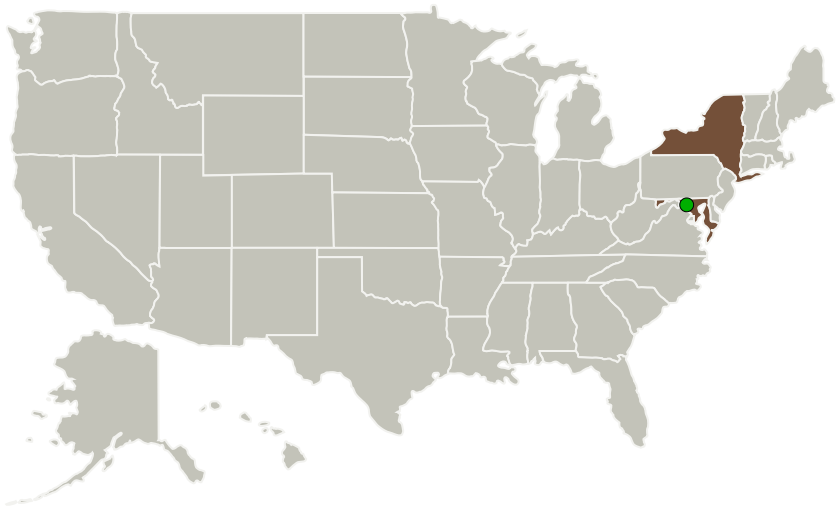
Project Introduction

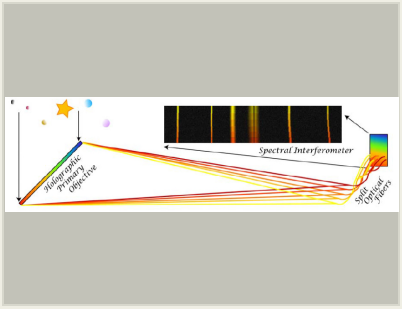
HOMES (Holographic Optical Method for Exoplanet Spectroscopy) is a space telescope that employs a double dispersion architecture, using a holographic optical element as a primary objective in conjunction with a novel secondary spectral interferometer. Unlike mirrors and lenses, the holograms are thin and flat, can be fabricated on thin gossamer membranes and stretched over space frames covering thousands of square meters. HOMES (Holographic Optical Method for Exoplanet Spectroscopy) is a space telescope designed for exoplanet discovery. Its double dispersion architecture employs a holographic optical element as a primary objective in conjunction with a novel secondary spectral interferometer. Unlike mirrors and lenses, the holograms are thin and flat. They can be fabricated on thin gossamer membranes and stretched over space frames covering thousands of square meters. This provides the scale of collector needed to capture the photons from very faint sources like exoplanets and bring them to a focus. Because holographic optics focus by the process of dispersion, they are intrinsically spectrographic providing a wealth of detail about the composition of the images they form. Add to this a novel notch filter to dim the star that takes advantage of the spectrographic image, and HOMES is a concept that addresses the demanding specifications of a telescope to find habitable planets within 30 light years of earth.

Anticipated Benefits

This technology could enable new discoveries about exoplanets on stars within 10 pc of the observatory.

Primary U.S. Work Locations and Key Partners





Project Image HOMES - Holographic Optical Method for Exoplanet Spectroscopy

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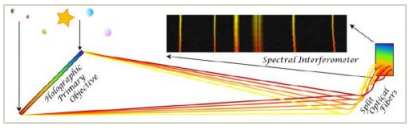
Organizations Performing Work	Role	Type	Location
3DeWitt LLC	Lead Organization	Industry	
Goddard Space Flight Center(GSFC)	Supporting Organization	NASA Center	Greenbelt, Maryland

Primary U.S. Work Locations	
Maryland	New York

Images



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Project Image HOMES - Holographic Optical Method for Exoplanet Spectroscopy
(https://techport.nasa.gov/image/102097)

Organizational Responsibility

Responsible Mission Directorate:
Space Technology Mission Directorate (STMD)

Lead Organization:
3DeWitt LLC

Responsible Program:
NASA Innovative Advanced Concepts

Project Management

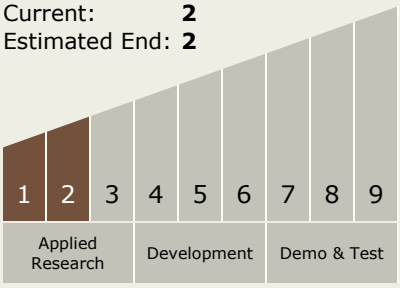
Program Director:
Jason E Derleth

Program Manager:
Eric A Eberly

Principal Investigator:
Thomas Ditto

Technology Maturity (TRL)

Start: **1**
Current: **2**
Estimated End: **2**



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Technology Areas

Primary:

- TX08 Sensors and Instruments
  - TX08.2 Observatories
    - TX08.2.1 Mirror Systems

Target Destinations

Earth, Foundational Knowledge